

R E M A R K S

In the Final Office Action mailed March 27, 2008, the Examiner rejected claims 1-22 under 35 USC §112(1) as failing to comply with the written description requirement. The Examiner rejected claims 1, 5, and 6 under 35 USC §103(a) as being unpatentable over Hemingway et al. (US 2004/0093853) in view of Hoard et al. (US 6,363,714). The Examiner rejected claims 10, 14, 15, and 19-22 under 35 USC §103(a) as being unpatentable over Nakanishi et al. (US 7,043,902) in view of Hoard et al. '714.

The Examiner is respectfully requested to reconsider and re-examine the application considering the following comments.

Rejection of Claims 1-22 Under 35 USC §112(1)

In response to Applicants' previously filed amendment adding "to initiate diagnosis of the nonthermal plasma discharge device", the Examiner: 1) objected to the amendment as introducing new matter; and 2) rejected all pending claims for failing to comply with the written description requirement. The Examiner indicated that the Office Action analysis was based on "the previously presented subject matters accordingly" and did not address Applicants claim amendments. Applicants respectfully disagree with the Examiner and traverse the Examiner's rejection and requirement for cancellation of the amended limitations.

The Examiner's attention is directed to MPEP §706.03(o) and in particular to Examiner's Note 3 which states in pertinent part " If new matter is added only to a claim, an objection using this paragraph [7.28] **should not be made**, but the claim should be rejected using form paragraph 7.31.01. As to any other appropriate prior art or 35 U.S.C. 112 rejection, **the new matter must be considered as part of the claimed subject matter and cannot be ignored.**" As such, the Examiner is not entitled to address only "the previously presented subject matters", but must address the limitation of "to initiate diagnosis of the nonthermal plasma discharge device" which is clearly supported by the originally filed disclosure and is not new matter as described in detail below.

The Examiner's position that this claim limitation is not supported by the original disclosure is clearly erroneous. This claim limitation is supported throughout the written description and drawings including the first words of the

title of the application: "DIAGNOSING AN AFTERTREATMENT SYSTEM", the pre-amble of all the independent claims 1 and 10 as originally filed include "A method for diagnosing operation of a nonthermal plasma discharge device". Likewise, independent claim 19 is directed to "A system for diagnosing operation of an exhaust aftertreatment system". Figure 4, block 198 states "Start diagnostic when LNT recently purged" and block 202 states "Reduce power to NPDD. Block 212 states "End diagnostic". See also Fig. 5, blocks 398, 402, and 412. As stated in the specification on p.2, l. 32, "A method for diagnosing operation ...includes reducing power to the nonthermal plasma discharge device." As stated on p. 3, ll. 28-30, Figs. 4 and 5 show diagnostic procedures to determine operational activity of the nonthermal plasma discharge device. As described beginning on p. 8, l. 10, "A diagnostic routine for NPDD 56 is shown in Figure 4. Beginning in step 198, the diagnostic routine is initiated ... the diagnostic routine is undertaken ... Power to NPDD 56 is reduced in step 202..."

The invention as disclosed and claimed is clearly directed to a system and method for diagnosis. The claims were amended to more particularly point out this distinguishing feature relative to the prior art of Hemmingway et al., Hoard et al., and Nakanishi et al. relied upon by the Examiner, all of which are directed to controlling an NPDD and none of which disclose or suggest a diagnostic system or method to determine if the NPDD is operating properly. As such, initiating diagnosis of the NPDD is clearly not new matter. This is explained in the specification, illustrated in the drawings, and was inherently claimed in the originally filed claims, but made an explicit limitation to further distinguish Applicants' claimed invention from the prior art relied upon by the Examiner. Whether referred to as initiating diagnosis, starting diagnosis, undertaking diagnosis, or similar language, the written description and drawings clearly meet the written description requirement of 35 USC §112(1) and the Examiner is requested to reconsider and withdraw the objection to the amendment for new matter and the rejection of claims 1-22 under 35 USC §112(1). Furthermore, the Examiner is respectfully requested to consider the amendment relative to the prior art considering the more detailed comments below.

Rejection Under 35 USC §103(a) of claims 1, 5, and 6

The Examiner rejected claims 1, 5, and 6 as being unpatentable over Hemingway et al. (US 2004/0093853) in view of Hoard et al. (US 6,363,714). Applicants respectfully disagree and traverse the Examiner's rejection.

As described above, Applicants' claimed invention is directed to a method for diagnosing the NPDD. In contrast, Hemingway et al. is directed to controlling the power supplied to the NPDD to maintain a desired operating temperature range. Applicants' claim 1 recites: "reducing power to the nonthermal plasma discharge device to initiate diagnosis of the nonthermal plasma discharge device." Hemingway, et al. consistently teach: "The controller...can control the power supply to maintain the reactor temperature at the desired temperature," paragraph 0014. Paragraphs 0015-0018, 0023, and 0024 contain similar discussion concerning controlling power to maintain a temperature in the reactor. No where do Hemingway, et al. discuss reducing power to initiate diagnosis as disclosed and claimed by Applicants. There is no disclosure or suggestion of diagnosing or determining if the NPDD is operating correctly using any other method either. There is simply no disclosure or suggestion in Hemingway et al. to reduce power supplied to the NPDD for any reason other than to control the temperature of the NPDD.

Similarly, Hoard et al. '714 is directed to controlling power to conserve energy and notes that prior art approaches operated the NPDD continuously regardless of the concentration of NO_x in the exhaust stream resulting in wasted energy. As such, Hoard et al. '714 teaches: "controlling power to a plasma-catalyst...in accordance with...values of engine or vehicle operational parameters in order to optimize emission reduction versus energy cost." No where do Hoard et al. discuss "reducing power to...diagnos[e]" the NPDD. Rather, Hoard et al. modulates power supplied to the NPDD in response to the NO_x concentration by increasing power with higher detected NO_x concentrations and decreasing power for lower detected NO_x concentration. Hoard et al. '714 does not disclose or suggest any method for diagnosing or determining if the NPDD is operating correctly as disclosed and claimed by Applicants. Hoard et al. '714 does not

disclose or suggest reducing power supplied to the NPDD for any reason other than conserving power in response to a lower detected NOx concentration.

Because neither Hemingway et al. nor Hoard et al. '714 disclose any method for diagnosing the NPDD, neither discloses determining that the NPDD is operating properly by any method. Furthermore, neither Hemingway et al. nor Hoard et al. '714 disclose determining that the NPDD is operating properly when NOx concentration exiting the LNT increases in response to reducing power to the NPDD as disclosed and claimed by Applicants. As such, the proposed combination, even if proper, fails to teach or suggest diagnosing the NPDD by reducing power and then determining proper operation when the NOx concentration increases in response to the reduced power. As described in Applicants' specification (p. 8, l. 24 to p.9, l. 18), and illustrated in Figs. 4-5, reducing power (or fuel) does not necessarily result in increased NOx concentration even when the NPDD is operating properly. As such, power (or fuel) may be progressively lowered (Claims 3, 12) or shut off (Claim 5, 13) when NOx concentration remains substantially constant in response to the initial reduction of power/fuel to more accurately determine that the NPDD is not operating properly.

In this respect, the method of controlling the NPDD disclosed by Hoard et al. '714 actually teaches away from Applicants' claimed invention. As disclosed by Hoard et al. '714, power to the NPDD would be increased in response to an increase in NOx concentration or would be maintained in response to a substantially constant NOx concentration. As such, the proposed combination of Hemingway et al. and Hoard et al. '714 would result in a method for controlling NPDD operation that modulates power supplied to the NPDD to control operating temperature or to control NOx concentration, not a method for diagnosing operation of the NPDD as disclosed and claimed by Applicants.

Applicants' invention as claimed in Claims 1, 5, and 6 is directed to a method for diagnosing the NPDD, i.e. determining whether the NPDD is operating properly. The diagnostic is initiated by reducing power or fuel supplied to the NPDD. Power/fuel is not reduced in response to detected NOx concentration as disclosed by Hoard et al. '714 or in response to NPDD

temperature as disclosed by Hemingway et al., but rather to initiate diagnosis of the NPDD. The diagnosis is completed or ended by determining that the NPDD is operating properly when NOx concentration increases in response to reducing power to the NPDD. For these reasons, Applicants respectfully request the Examiner to reconsider and withdraw the rejection under 35 USC §103(a) of Claims 1, 5, and 6.

Rejection Under 35 USC §103(a) of Claims 10, 14 15, 17-21

The Examiner rejected claims 10, 14, 15, and 17-21 as being unpatentable over Nakanishi et al. (US 7,043,902) in view of Hoard et al '714. Applicants respectfully disagree and traverse the Examiner's rejection.

The Examiner alleges that the primary reference to Nakanishi discloses "controlling the power of the plasma based on the concentration of the NOx in the exhaust gas" Applicants submit that Nakanishi does not show controlling the power of the plasma, except in column 12, lines 6-15, in which the adjustment is made to provide a desired electric field intensity and power density, not based on providing a desired concentration of NOx. Instead, Nakanishi shows: "The controlling device 9 is composed so that the reducing agent adding means 10 controls a timing to supply a reducing agent, based on a temperature detecting signal output from a temperature..." in column 7, lines 21-26. Similar references to controlling the reducing agent supply based on temperature are found in column 7, lines 2-3, lines 8-11, lines 20-67 and in column 8, lines 1-4 and 63-67. Nakanishi does not disclose any system or method for diagnosing an NPDD and does not disclose or suggest initiating diagnosis by reducing fuel supply to the NPDD as disclosed and claimed by Applicants. Likewise, because Nakanishi does not disclose or suggest a system/method for diagnosing the NPDD, there is no disclosure or suggestion for determining if the NPDD is operating properly based on an increase in NOx in response to reducing fuel supplied to the NPDD.

As described above, the secondary reference to Hoard et al. '714 also fails to disclose or suggest diagnosing the NPDD by reducing fuel or power supplied to the NPDD and monitoring resulting NOx concentration to determine whether

the NPDD is operating properly. Rather, Hoard et al. '714 discloses controlling power to the NPDD to optimize power consumption while controlling NOx concentration within a desired range. As such, the proposed combination of Nakanishi et al. with Hoard et al. '714, even if proper, fails to teach or suggest a system or method for diagnosing an NPDD with diagnosis initiated by reducing fuel to the NPDD and determining that the NPDD is operating properly when the reduction results in an increase in NOx concentration as disclosed and claimed by Applicants.

In particular, with respect to Applicants' claim 10, Nakanishi et al. adjust reducing agent based on a temperature detecting signal, not to initiate a diagnostic procedure as disclosed and claimed by Applicants. Similarly, Hoard et al. does not show reducing fuel supply to initiate diagnosis of the NPDD. Because neither reference shows such limitation, the combination, if proper, also does not show such limitation. Likewise, neither reference discloses determining whether the NPDD is operating correctly. As such, Applicants respectfully request that the rejection of claims 10 and dependent claims 14 and 15 be withdrawn.

With respect to Applicants' claim 19, neither reference discloses or suggests "said electronic control unit reducing supply of an energy quantity to said nonthermal plasma discharge device to initiate diagnosis of said nonthermal plasma discharge device." Applicants respectfully request withdrawal of the rejection to claim 19 and claims 20-22 which depend therefrom.

For the reasons described in detail above, Applicants' believe the invention as claimed clearly distinguishes over the prior art relied upon by the Examiner. Applicants respectfully request the Examiner to reconsider and withdraw the rejection under 35 USC §103(a) of Claims 10, 14, 15, and 17-21.

Summary

Applicants have made a genuine effort to respond to the Examiner's objections and rejections to advance prosecution of this application. Applicants respectfully submit that all substantive and formal requirements for patentability have been met and this case is in condition for allowance, which action is respectfully requested.

The extension of time fee for a one-month extension was paid upon filing. No other fees are believed to be due. However, please charge any required fees or apply credits to Deposit Account 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No.06-1505.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "David S. Bir". The signature is fluid and cursive, with the first letters of each word being capitalized and prominent.

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Date: 24-July-2008